## **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

- 1. (Currently Amended) A synthetic co-polymer comprising one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety, said synthetic co-polymer having a number average molecular mass between about 2,000 and about 1,000,000 <u>Daltons</u>, wherein said synthetic co-polymer is reactive with primary amines via the pendant cross-linkable moiety-, wherein said acrylamide co-monomer and said hydrophilic co-monomer are different, and wherein said co-polymer is suitable for implantation in a patient.
- 2. (Currently Amended) The synthetic co-polymer according to claim 1, wherein:
- (a) said N-alkyl or N,N-dialkyl substituted acrylamide co-monomer has a structure of Formula I:

$$\begin{array}{c|c}
 & R_1 & R_2 \\
\hline
 & C & C & \\
 & C & R_3
\end{array}$$

$$\begin{array}{c|c}
 & R_2 & \\
 & R_3 & \\
\hline
 & R_4 & R_5
\end{array}$$

wherein:

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> are independently selected from the group of: H and lower alkyl;

(b) said hydrophilic co-monomer has a structure of Formula II:

$$\begin{array}{c|cccc} & R_6 & R_7 \\ \hline & & \\ \hline & \\ \hline & &$$

wherein:

Y is O or is absent;

R<sub>6</sub>, and R<sub>7</sub> are independently selected from the group of H and lower alkyl;

R<sub>8</sub> is H, lower alkyl or -OR', where R' is H or lower alkyl; and

 $R_9$  is H, lower alkyl or -C(O) $R_{10}$ , and

R<sub>10</sub> is -NR<sub>4</sub>R<sub>5</sub>-or -OR", where R" is H or CH<sub>2</sub>CH<sub>2</sub>OH; and

(c) said acryl- or methacryl- carboxylic acid co-monomer has a structure of Formula III:

$$\begin{array}{c|c}
R_{11} & R_{12} \\
\hline
C & C \\
R_{13} & C = O
\end{array}$$
III

wherein:

 $R_{11}$ ,  $R_{12}$  and  $R_{13}$  are independently selected from the group of: H and lower alkyl, and Q is N-succinimido, 3-sulpho-succinimdo (sodium salt), N-benzotriazolyl, N-imidazolyl and p-nitrophenyl.

- 3-4. (Cancelled)
- 5. (Currently Amended) The synthetic co-polymer according to claim 1 2, wherein said alkyl or lower alkyl is a straight or branched chain alkyl group having between one and eight carbon atoms.

- 6. (Original) The synthetic co-polymer according to claim 2, wherein the combined molar ratio of N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and hydrophilic co-monomer is between about 50% and about 99.5% and the molar ratio of derivatised acryl- or methacryl- carboxylic acid co-monomer is between about 0.5% and about 50%, wherein the sum of said molar ratios is 100%.
- 7. (Cancelled)
- 8. (Previously Presented) The synthetic co-polymer according to claim 1, wherein said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer is selected from the group of N-methylacrylamide, N-ethylacrylamide, N isopropylacrylamide (NiPAAm), N-octylacrylamide, N-cyclohexylacrylamide, N-methyl-N-ethylacrylamide, N-methylmethacrylamide, N-methylmethacrylamide, N-isopropylmethacrylamide, N,N-dimethylacrylamide, N,N-dimethylmethacrylamide, N,N-diethylacrylamide, N,N-dimethylmethacrylamide, N,N-diethylmethacrylamide, N-methyl-N-cyclohexylacrylamide, N-acryloylpyrrolidine, N-vinyl-2-pyrrollidinone, N-methacryloylpyrrolidine, and combinations thereof.
- 9. (Currently Amended) The synthetic co-polymer according to claim 1, wherein said one or more hydrophilic co-monomer is a selected from the group of: acrylic acid, methacrylic acid, 2-hydroxyethyl methacrylate (HEMA), N,N dimethylacrylamide, N,N diethylacrylamide, 2-[N,N dimethylamino]ethylacrylamide, 2-[N,N diethylamino]ethylacrylamide, N,N diethylamino]ethylacrylamide, 2-[N,N diethylamino]ethylacrylamide, 2-[N,N diethylamino]ethylacrylate, 2-[N,N diethylamino]ethylacrylate, 2-[N,N diethylamino]ethylacrylate, 2-[N,N diethylamino]ethylacrylate, 2-[N,N diethylamino]ethylacrylate, and combinations thereof.
- 10. (Previously Presented) The synthetic co-polymer according to claim 1, wherein said one or more acryl- or methacryl-carboxylic acid co-monomer is selected from the group of acrylic acid, methacrylic acid, and substituted versions thereof, and said cross-linkable moiety is a succinimidyl group, an imidazole, a benzotriazole, ap-nitrophenol or 2-(N-morpholino)ethanesulphonic acid.
- 11. (Original) The synthetic co-polymer according to claim 2 that comprises N,N-dimethylacrylamide and N-acryloxysuccinimide.

- 12. (Currently Amended) The synthetic co-polymer according to claim <u>32</u> that comprises N-isopropylacrylamide, acrylic acid and N-acryloxysuccinimide.
- 13. (Withdrawn) A bio-synthetic matrix comprising:
- (a) the synthetic co-polymer according to claim 1;
- (b) a bio-polymer; and
- (c) an aqueous solvent,

wherein said synthetic co-polymer and said bio-polymer are cross-linked through said pendant cross-linkable moiety to form a hydrogel.

- 14. (Withdrawn) The bio-synthetic matrix according to claim 13, wherein the amount of synthetic co-polymer is between about 0.1 % and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.
- 15. (Withdrawn) The bio-synthetic matrix according to claim 13, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.
- 16. (Withdrawn) The bio-synthetic matrix according to claim 13 further comprising one or more bioactive agent.
- 17. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said one or more bioactive agent is covalently bonded to said synthetic co-polymer through said pendant cross-linkable moiety.
- 18. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said bioactive agent comprises the pentapeptide having the sequence YIGSR (SEQ ID NO:1).
- 19. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said one or more bioactive agent is dispersed in said matrix.

- 20. (Withdrawn) The bio-synthetic matrix according to claim 13, further comprising a plurality of cells dispersed in said matrix.
- 21. (Withdrawn) A method for regenerating tissue in an animal comprising the step of implanting the bio-synthetic matrix according to claim 13 such that said bio-synthetic matrix acts as a scaffold for tissue regeneration in said animal.
- 22. (Withdrawn) A method for replacing damaged or removed tissue in an animal comprising the step of implanting the bio-synthetic matrix according to claim 13 in said animal.
- 23. (Withdrawn) The method according to claim 22, wherein said tissue is skin or part of an organ.
- 24. (Withdrawn) The method according to claim 22, wherein said tissue is a cornea or a part of a cornea.
- 25. (Withdrawn) A method for coating a surgical implant comprising the step of applying the bio-synthetic matrix according to claim 13 to a surface of said surgical implant.
- 26. (Withdrawn) A composition comprising:
- (a) one or more bioactive agent;
- (b) the synthetic co-polymer according to claim 1;
- (c) a bio-polymer; and
- (d) an aqueous solvent.
- 27. (Withdrawn) A composition comprising:
- (a) a plurality of cells;
- (b) the synthetic co-polymer according to claim 1;
- (c) a bio-polymer; and
- (d) an aqueous solvent.

- 28. (Withdrawn) The composition according to claim 27, wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.
- 29. (Withdrawn) The composition according to claim 27, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.
- 30. (Withdrawn) The composition according to claim 27, wherein said synthetic co-polymer and said bio-polymer are cross-linked.
- 31. (Withdrawn) The composition according to claim 27, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.
- 32. (Withdrawn) The composition according to claim 27, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.
- 33. (Withdrawn) The composition according to claim 27, which is a pre-formed hydrogel.
- 34. (Withdrawn) An implant for use in tissue engineering comprising a pre-formed biosynthetic matrix, said matrix comprising an aqueous solvent and a bio-polymer cross-linked with the synthetic co-polymer according to claim 1.
- 35. (Withdrawn) The implant according to claim 34, wherein said bio-polymer is selected from the group of. collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.
- 36. (Withdrawn) The implant according to claim 34, wherein the amount of synthetic polymer is between about 0.1 % and 30% by weight, the amount of bio-polymer is between about 0.3% and 50% by weight and the amount of aqueous solvent is between about 20% and 99.6% by weight.

- 37. (Withdrawn) The implant according to claim 34, wherein said bio-synthetic matrix supports in-growth of nerves.
- 38. (Withdrawn) The implant according to claim 34, further comprising one or more bioactive agent.
- 39. (Withdrawn) The implant according to claim 38, wherein said bioactive agent is covalently attached to co-polymer through said pendant cross-linkable moiety.
- 40. (Withdrawn) The implant according to claim 34, further comprising a plurality of cells dispersed in said matrix.
- 41. (Withdrawn) The implant according to claim 40, wherein said cells are stem cells or precursor cells.
- 42. (Withdrawn) Use of the implant according claim 34 as an artificial cornea.
- 43. (Withdrawn) A process for preparing a synthetic co-polymer comprising:
- (a) dispersing one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety in a solvent in the presence of an initiator;
- (b) allowing said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl-carboxylic acid co-monomer to polymerise to form a synthetic co-polymer, and
- (c) optionally purifying said synthetic co-polymer.
- 44. (Withdrawn) A process for preparing a bio-synthetic matrix comprising the steps of :
- (a) preparing a synthetic co-polymer by the process according to claim 43;
- (b) dispersing said synthetic co-polymer and a bio-polymer in an aqueous medium; and
- (c) allowing said synthetic co-polymer and said bio-polymer to cross-link to provide said bio-synthetic matrix.

- 45. (Withdrawn) The process according to claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are the same.
- 46. (Withdrawn) The process according to claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are different.
- 47. (Withdrawn) The process according to claim 44, further comprising mixing said synthetic co-polymer with one or more bioactive agent prior to step (b) and allowing said bioactive agent to cross-link to said synthetic co-polymer through said pendant cross-linkable moiety.
- 48. (Withdrawn) The process according to claim 44, further comprising mixing said synthetic co-polymer and said bio-polymer with a plurality of cells in step (b).
- 49. (Currently Amended) A synthetic co-polymer produced by the process according to elaim 43.
- (a) dispersing one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety in a solvent in the presence of an initiator;
- (b) allowing said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl-carboxylic acid co-monomer to polymerise to form a synthetic co-polymer, and
- (c) optionally purifying said synthetic co-polymer,

wherein said acrylamide co-monomer and said one or more hydrophilic co-monomer are different, and wherein said co-polymer is suitable for implantation in a patient.

- 50. (Withdrawn) A bio-synthetic matrix produced by the process according to claim 44.
- 51-110. (Cancelled)

- 111. (Currently Amended) The synthetic co-polymer according to claim 4 2, wherein said alkyl or lower alkyl is cycloalkyl group having between three and six carbon atoms.
- 112. (Withdrawn) The composition according to claim 26, wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.
- 113. (Withdrawn) The composition according to claim 26, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.
- 114. (Withdrawn) The composition according to claim 26, wherein said synthetic co-polymer and said bio-polymer are cross-linked.
- 115. (Withdrawn) The composition according to claim 26, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.
- 116. (Withdrawn) The composition according to claim 26, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.
- 117. (Withdrawn) The composition according to claim 26, which is a pre-formed hydrogel.
- 118. (New) The synthetic co-polymer of claim 1, which is suitable for corneal implantation in a patient.